PART I - ADMINISTRATIVE

Section 1. General administrative information

Title of project

Monitor Natural Escapement & Productivity Of John Day Basin Spring Chinook

BPA project number: 9801600
Contract renewal date (mm/yyyy): 7/1999 ☐ **Multiple actions?**

Business name of agency, institution or organization requesting funding
Oregon Department of Fish and Wildlife

Business acronym (if appropriate) ODFW

Proposal contact person or principal investigator:

Name	Richard Carmichael
Mailing Address	211 Inlow Hall, EOU
City, ST Zip	La Grande, OR 97850
Phone	(541) 962-3777
Fax	(541) 962-3067
Email address	odfw2@eou.edu

NPPC Program Measure Number(s) which this project addresses
4.3C "Population Monitoring"
7.1C "Collection of population status, life history and other data on wild and natural spawning populations"

FWS/NMFS Biological Opinion Number(s) which this project addresses

Other planning document references

Short description
Monitor and assess natural escapement and productivity of John Day River Basin spring chinook salmon. This project is in direct response to recommendations and needs of the PATH project.

Target species
Spring chinook salmon

Section 2. Sorting and evaluation

Subbasin
John Day River

Evaluation Process Sort

CBFWA caucus	Special evaluation process	ISRP project type

Mark one or more caucus	If your project fits either of these processes, mark one or both	Mark one or more categories
☒ Anadromous fish ☐ Resident fish ☐ Wildlife	☒ Multi-year (milestone-based evaluation) ☐ Watershed project evaluation	☐ Watershed councils/model watersheds ☐ Information dissemination ☐ Operation & maintenance ☐ New construction ☒ Research & monitoring ☐ Implementation & management ☐ Wildlife habitat acquisitions

Section 3. Relationships to other Bonneville projects

Umbrella / sub-proposal relationships. List umbrella project first.

Project #	Project title/description
20514	John Day River Subbasin Umbrella

Other dependent or critically-related projects

Project #	Project title/description	Nature of relationship
9600800	PATH	Provide the PATH project with annual estimates of spawner escapement, age-structure, and smolt-to-adult survival rates for this index population for assessing the effects of alternative future management actions on salmon stocks in the Columbia Basin
8810804	StreamNet	This project will provide data for StreamNet.

Section 4. Objectives, tasks and schedules

Past accomplishments

Year	Accomplishment	Met biological objectives?
1998	Conducted multiple and extensive spawning surveys in John Day subbasin.	Estimated total number of spring chinook salmon spawners returning to John Day River subbasin.
1998	Sampled over 300 carcasses of spawned spring chinook salmon to determine sex and age.	Determined sex ratio, age structure, and documented strays of returning spring chinook spawners.

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Estimate total number of spring chinook spawners returning to the John Day River subbasin.	a	Conduct extensive spawning ground counts in addition to annual index surveys.
		b	Conduct surveys throughout the range of available habitat to determine spawner distribution.
		c	Conduct multiple surveys which temporally bracket the historic index counting time.
2	Determine sex ratio and age structure of returning spring chinook salmon spawners.	a	Sex and collect scales from carcasses recovered during surveys.
		b	Analyze scales to determine age.
		c	Develop length-age relationships to classify fish that have unreadable scales.
		d	Calculate age structure and sex ratios.
3	Determine adequacy of historic spring chinook index areas/counts for estimating spawner abundance.	a	Determine percentage of spawning that occurs outside index areas in each major spawning stream.
		b	Determine percentage of spawning that occurs after index surveys are conducted.
		c	Analyze spatial and temporal variability to assess adequacy of index counts to estimate escapement.
4	Estimate smolt-to-adult survival rates of spring chinook salmon.	a	Collect emigrating spring chinook salmon smolts via seining and irrigation bypass traps.
		b	Insert PIT tags into approximately 3,000 smolts.
		c	Record PIT tag detections of returning adults at Columbia River dam passage facilities, and recover PIT tags from returning spawners.
		d	Estimate smolt-to-adult survival rates based on PIT tag returns.

Objective schedules and costs

Obj #	Start date mm/yyyy	End date mm/yyyy	Measureable biological objective(s)	Milestone	FY2000 Cost %
1	8/1998	10/2007	Estimate total number of spring chinook spawners returning to the John Day River subbasin.		40.00%
2	8/1998	10/2007	Determine sex ratio and age structure of returning spring chinook salmon spawners.		15.00%
3	8/1998	10/2007	Determine adequacy of historic spring chinook index areas/counts for estimating spawner abundance.		12.00%

4	2/2000	10/2007	Estimate smolt-to-adult survival rates of spring chinook salmon.		33.00%
				Total	100.00%

Schedule constraints
High water during smolt outmigration may limit our ability to capture adequate number of smolts for objective 4.

Completion date
2007, to account for 5 years of smolt tagging and recovery of adults tagged as smolts through 2004.

Section 5. Budget

FY99 project budget (BPA obligated): $125,400

FY2000 budget by line item

Item	Note	% of total	FY2000
Personnel		%34	61,500
Fringe benefits		%13	23,300
Supplies, materials, non-expendable property		%6	10000
Operations & maintenance		%5	8,100
Capital acquisitions or improvements (e.g. land, buildings, major equip.)	jet boat, 2 notebook computers, 2 portable balances	%15	27,600
NEPA costs		%0	
Construction-related support		%0	
PIT tags	# of tags: 3,000	%5	8,700
Travel		%2	3,000
Indirect costs		%21	37,600
Subcontractor		%0	
Other		%0	
TOTAL BPA FY2000 BUDGET REQUEST			$179,800

Cost sharing

Organization	Item or service provided	% total project cost (incl. BPA)	Amount ($)
		%0	
		%0	
		%0	
		%0	
Total project cost (including BPA portion)			$179,800

Outyear costs

	FY2001	FY02	FY03	FY04
Total budget	$157,100	$165,000	$173,300	$182,000

Section 6. References

Watershed?	Reference
☐	Beamesderfer, R., H. Schaller, M. Zimmerman, C. Petrosky, O. Langness, and L. La Voy. 1997. Spawner-recruit data for spring and summer chinook salmon populations in Idaho, Oregon, and Washington. Report from ODFW, IDFG, and WDFW to BPA for PATH.
☐	Lindsay, R.B. , W.J. Knox, M.W. Flesher, B.J. Smith, E.A. Olsen, and L.S. Lutz. 1986. Study of Wild Spring Chinook Salmon in the John Day River System. 1985 Final Report. DE-A179-83BP39796, Bonneville Power Administration, Portland, Oregon.
☐	Schaller, et al. 1996. Contrasts in stock-recruitment patterns of Snake and Columbia Rivers spring and summer chinook populations. Ch. 3 in D.R. Marmorek, editor. PATH final report on retrospective analyses. ESSA Technologies, B.C.
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PART II - NARRATIVE

Section 7. Abstract

The John Day subbasin supports one of the healthiest populations of spring chinook salmon in the mid-Columbia River Basin. The study of life history and natural escapement conducted from 1978 to 1984 (Lindsay, et al. 1986) provided valuable information on production and productivity of John Day spring chinook salmon. However, between the completion of the life history and natural escapement study in 1984 and the start of this project in 1998, spring chinook spawning surveys were conducted in index areas only, with the exception of two years (1989 and 1995), and have not provided adequate information to assess age structure, progeny-to-parent production values, and estimate natural spawning escapement. The PATH Project has identified the John Day subbasin spring chinook population as an index population for assessing the effects of alternative future management actions on salmon stocks in the Columbia Basin (Beamesderfer, et al. 1997). We believe the John Day spring chinook are the most important lower river index stock and the PATH Project will rely heavily on data from this population in the future. To meet the data needs as an index stock, sufficient annual estimates of spawner escapement, age structure, and smolt-to-adult survival are essential. There is a need to determine the annual spawner escapement and age structure for the John Day subbasin spring chinook to provide us the ability to estimate progeny-to-parent production for each brood year. This need can be met by expanding the annual chinook spawning surveys, estimating annual escapement, determining age composition by scale analyses, and PIT tagging naturally produced smolts in the John Day subbasin.

Section 8. Project description

a. Technical and/or scientific background

The John Day population of spring chinook has been identified in the PATH process as an index stock for assessing the effects of alternative future management actions on salmon stocks in the Columbia and Snake river basins (Beamesderfer, et al. 1997). We believe the John Day spring chinook are the most important lower river index stock because the subbasin supports one of the healthiest populations of spring chinook in the mid-Columbia (perhaps the entire basin). A study of life history characteristics of spring chinook in the John Day subbasin was completed by Lindsay, et al. (1986). However, extensive surveys of all available spawning habitat and age structure information has not been collected consistently since then. Extensive surveys have been completed only in 1989, 1995, and in 1998 under this project, subsequently, up-to-date survival and escapement information is incomplete.

b. Rationale and significance to Regional Programs

This project addresses FWP measure 4.3C "Population Monitoring". Project objectives 1, 2, and 4 will provide survival and escapement information for this healthy lower mid-Columbia River stock which will be applicable to other stocks in the geographic area. Objective 3 will determine the adequacy of the traditional index surveys for estimating total escapement to the subbasin. A current profile on the status of this wild spawning stock of spring chinook salmon will be developed as requested under FWP measure 7.1C "Collection of Population Status, Life History and Other Data on Wild and Naturally Spawning Populations".

c. Relationships to other projects

The PATH project will rely heavily on data from this population in the future. The PATH process is intended to ensure that the region has the benefit of the best available scientific information in analyses supporting salmon recovery/rebuilding efforts, including: development of recovery plans for listed Endangered Species Act (ESA) salmon and steelhead populations; ESA section 7 consultations: and development of rebuilding programs under the Columbia Basin Fish and Wildlife Program. To meet the data needs as an index stock, sufficient annual estimates of spawner escapement, age structure, and smolt-to-adult survival are essential. There is a need to determine the annual spawner escapement and age structure for the John Day spring chinook salmon to provide us the ability to estimate parent-to-progeny production for each brood year. This need can be met by expanding the annual spring chinook spawning ground surveys, estimating annual escapement, determining age composition by scale analyses, and PIT tagging naturally produced smolts from the John Day subbasin. Results of this project may be used to evaluate the effectiveness of hydroelectric operations and fish recovery efforts in the Columbia Basin. In addition, this project will provide essential information for ODFW to assess status and health of the John Day spring chinook salmon population as well as the incidence of hatchery strays on spawning grounds.

The annual spawner escapement information is essential to PATH to estimate spawners and recruits in order to estimate survival of the John Day wild spring chinook salmon stock, and to compare survival differences through time and space with other stocks (Schaller, et al. 1996). The information obtained by PIT tagging juvenile spring chinook salmon is essential to PATH to estimate smolt-to-adult survival rates of a non-transported lower river stock of wild spring chinook salmon, and to compare those rates through time and space with other stocks (Schaller, et al. 1996).

d. Project history (for ongoing projects)

This project began July 1998. We surveyed 55 miles of stream in the spring chinook spawning ground survey index areas of the John Day subbasin, 54 miles of stream outside of the index sections, and 110 miles during repeat surveys of the index sections. We estimated total spawning escapements of 428 spawners for the mainstem John Day subpopulation, 274 spawners for the Middle Fork John Day subpopulation, and 643 spawners for the North Fork John Day subpopulation. We also sampled 306 carcasses to determine sex ratio and age structure of the spawning population. The budget for FY 98 was $92,939 and is projected at $125,400 for FY 99.

e. Proposal objectives

Objective 1. Estimate total number of spring chinook spawners returning to the John Day River subbasin. The estimate of spawners will be provided to PATH, StreamNet, and managers each year.

Objective 2. Determine sex ratio and age structure of returning spring chinook spawners.
The sex ratio and age structure of spawners will be provided to PATH, StreamNet, and managers each year.

Objective 3. Determine adequacy of historic spring chinook index areas/counts for estimating spawner abundance.

Objective 4. Estimate smolt-to-adult survival rates of spring chinook salmon.
Estimates of smolt-to-adult survival rates will be provided to PATH, StreamNet, and managers each year that estimates are available.

f. Methods

The project will follow a similar approach as ongoing spring chinook adult life history work in the Grande Ronde subbasin, however, the John Day River has only wild fish and only three dams to pass compared to eight dams for the Grande Ronde subbasin. Procedures and methods of data collection in this project have been widely used throughout the Northwest by all fish management agencies. Results will be provided to the PATH Project, StreamNet, managers, and reported in annual progress reports.

OBJECTIVE 1 METHODS: Chinook salmon spawning ground index area surveys are conducted each year during September in the John Day Basin. Specific stream surveys are scheduled to take place near peak of spawning in each system. To get a nearly complete count of redds in the basin, extensive and repeat surveys will be conducted. Extensive surveys will cover all areas where spawning is believed to occur. In the streams where index surveys are conducted, extensive surveys will be conducted at a similar time as the index survey. Repeat surveys are conducted one or two weeks after the index surveys within index areas. Pre-index surveys are conducted for the primary purpose of recovering carcasses.

Surveys are conducted on foot in a downstream direction with one or more surveyors. Stream sections average 3-5 miles in length, depending on accessibility and difficulty. Surveyors record the number of occupied and unoccupied redds observed, number of live adults and jacks observed, and the number and origin of carcasses recovered in each survey section. In stream reaches where we will conduct repeat surveys, redds are numbered and marked with colored flagging. Flagging is removed on the last repeat survey. Total redd estimates are made using redd counts from the extensive and repeat surveys. The total spawner estimate is derived by expanding the total redds with a fish per redd factor. Fish per redd estimates from the Imnaha River above the weir will be used. Products for this objective are specified in the tasks below.

Task 1.1. Develop detailed spawning ground survey schedules in cooperation with ODFW District Fish Biologist, Warm Springs Tribe and Umatilla Tribe biologists.

Task 1.2. In coordination with District Biologists, ensure landowner permission is obtained for access to private properties.

Task 1.3. Conduct spawning ground surveys in streams and sections identified in Task 1.1.

Task 1.4: Record the sex, length, finmark, degree of spawning (females only) and collect tags from any marked carcasses observed.

Task 1.5: Collect scale samples from all carcasses recovered in order to determine age. Cut the tails off all carcasses to avoid repeat sampling.

Task 1.6: Number and mark redds observed in repeat survey areas.

Task 1.7: Summarize survey results and calculate an estimate of total redds and escapement.

Objective 2 Methods: All carcasses recovered on spawning surveys will be sexed and scales will be taken. Age will be determined by scale analysis. We will record marks on all marked fish and recover and decode tags from Ad-marked fish. Origin of strays will be determined from CWT's and the proportion of natural spawners that are hatchery origin will be calculated. Products from this objective are specified in the tasks below.

Task 2.1: Record the sex, length, and fin marks from all carcasses, and recover snouts from Ad-marked carcasses.

Task 2.2: Mount and press scales. Analyze scales to determine age of individuals and determine age composition. Develop length-age relationship.

Task 2.3: Decode coded-wire tags from marked carcasses.

Task 2.4: Calculate the proportion of natural spawners that are hatchery-origin strays.

Objective 3 Methods: In the 1960's, regional managers identified stream sections that were considered primary spawning areas for spring chinook salmon, as well as choosing the time of year that represented peak spawning. These places and times became the index surveys. Extensive and repeat surveys will be conducted to determine the mean proportion of redds that occur in the index areas and the spatial and temporal variability.

Task 3.1: Calculate the percentage of total redds observed in the index areas on the day of the extensive index count. Compare the percentage for the current year with data from 1978-85 to assess changes in distribution.

Task 3.2: Calculate proportional increases in redds in repeat survey areas from index count time to last count. Assess variability through years in proportional change.

Objective 4 Methods: Spring chinook salmon smolts will be collected in the mainstem John Day River near Spray during spring using the methods of Lindsay et al. (1986). We will PIT tag the smolts and record detections and recoveries of the returning tagged adults to determine smolt-to-adult survival rates.

Task 4.1: Collect emigrating spring chinook salmon smolts via seining and irrigation bypass traps.

Task 4.2: Insert PIT tags into approximately 2,000 to 3,000 smolts.

Task 4.3: Record PIT tag detections of returning adults at Columbia River dam passage facilities, and recover PIT tags from returning spawners.

Task 4.4: Estimate smolt-to-adult survival rates based on PIT tag returns.

Critical assumptions: (1) PIT tag detection facilities will be installed at John Day and Bonneville dams and detection of PIT tagged juvenile and adult chinook at dams will occur; (2) access to private lands to conduct surveys will continue to occur; and (3) high streamflows will not prevent capture of adequate numbers of juvenile spring chinook for PIT tagging or prevent accurate counting of spring chinook redds during spawning surveys. This project will be coordinated with existing spawning surveys conducted by ODFW District personnel.

Risks associated with the project: Scales will be collected from dead salmon only. Salmon encountered during the course of spawning surveys may be temporarily disturbed, but resume normal spawning activity within minutes following the disturbance. In order to minimize the disturbance to spawning salmon, surveyors walk along the stream bank when possible. The survey is conducted as quickly as possible to minimize the chances of harassing spawning salmon. PIT tagging chinook smolts has risks associated with anesthetizing and tag implantation, however these effects can be minimized by following proper procedures. ODFW has been utilizing this technology in other subbasins for at least 6 years with good success.

g. Facilities and equipment

A jet boat and seines for capture of chinook smolts for PIT tagging, and the purchase of two notebook computers, two portable balances, and other PIT tagging equipment will be necessary. Office space for employees is available for rent in John Day and La Grande.

h. Budget

The personnel costs includes staff time for spawning surveys, collection and PIT tagging of smolts, data analysis, and report writing. Supplies costs are needed for spawning surveys, collection and tagging of smolts, and for analysis and writing. Capital costs include a jet boat for collecting smolts for tagging in spring, and notebook computers and balances for PIT tagging smolts. The indirect cost is based on an agreement between ODFW and the Federal Government.

Section 9. Key personnel

Richard W. Carmichael, Program Leader, 0.1 FTE

Education

B.S., Fisheries Science, Oregon State University, 1978
M.S., Fisheries Science, Oregon State University, 1983

Current employment

Oregon Dept. Fish and Wildlife, Fish Research and Development, La Grande, OR. July 1990 - present. Program Leader - Executive Manager for NE Oregon Scientific Investigations Program. Primary responsibilities are to develop and direct implementation of a complex research program to evaluate success of protecting, reestablishing, and restoring ESA listed and non-listed stocks in eastern Oregon.

Oversees the work of 14 full-time fisheries biologists and up to 8 projects, and represent ODFW on regional and national scientific committees. Adjunct professor at Eastern Oregon University.

Past employment

Fisheries Research Biologist (Project Leader), Oregon Department of Fish and Wildlife, LaGrande, OR. December 1983 to July 1990.

Fisheries Research Biologist (Assistant Project Leader), Oregon Department of Fish and Wildlife, LaGrande, OR. March 1983 to December 1983.

Project Assistant (Experimental Biology Aid), Oregon Department of Fish and Wildlife, LaGrande, OR. Oct. 1982 to March 1983.

Expertise

Expertise in fisheries research project development and implementation, personnel management, budget development and tracking, technical report writing, natural production and supplementation research, hatchery effectiveness, hatchery and wild fish interactions, life history, harvest assessment, stock assessment, passage evaluation, straying, captive broodstock, statistical analysis, coded-wire tag implementation and assessment, bass and trout ecology, creel censusing.

Recent publications

1998. Status review of the spring chinook salmon hatchery program in the Grande Ronde River Basin, Oregon. Lower Snake River Compensation Plan Status Review Symposium, USFWS, Boise, ID.

1998. Status review of the spring chinook salmon hatchery program in the Imnaha River Basin, Oregon. Lower Snake River Compensation Plan Status Review Symposium, USFWS, Boise, ID.

1997. Straying of Umatilla River hatchery origin fall chinook salmon into the Snake River. (R. W. Carmichael). *In* Genetic effects of straying of non-native hatchery fish into natural populations (R. S. Waples, convenor). National Oceanic and Atmospheric Administration, Seattle, WA.

1995. Status of supplementing chinook salmon natural production in the Imnaha River basin. *In* Uses and effects of cultured fishes in aquatic ecosystems (H.L. Shramm, Jr., and R.G. Piper, eds.)

1994. A comparison of the performance of acclimated and direct stream released , hatchery-reared steelhead smolts in Northeast Oregon. (Whitesel, T.A., P.T. Lofy, R.W. Carmichael, R.T. Messmer, M.W. Flesher, and D.W. Rondorf) Pages 87-92 *in* High performance fish (D.D. MacKinlay, ed.); Fish Physiology Section, American Fisheries Society, Fish Physiology Association, Vancouver, British Columbia, Canada.

1992. Straying of hatchery origin spring chinook salmon and hatchery:wild composition of naturally spawning adults in the Grande Ronde River basin. (Carmichael, R.W., L.A. Borgerson, and P.A. Lofy) *In* Salmon management in the 21st century: Recovering stocks in decline. Proceedings of the 1992 Northeast Pacific chinook and coho workshop. American fisheries Society, Bethesda, MD

Brian C. Jonasson, Project Leader, 0.3 FTE

Education

B.S., Fisheries Science, Oregon State University, 1979
M.S., Fisheries Science, Oregon State University, 1984

Current employment

Oregon Department of Fish and Wildlife, Fish Research and Development, La Grande, OR., July 1998 - present. Project Leader for John Day spring chinook escapement and productivity monitoring, Grande Ronde and Imnaha spring chinook escapement monitoring, and ESA coordination. Oversees and coordinates data collection and necessary project operations. Responsible for coordinating ESA and other research activities in the Grande Ronde basin. Prepares manuscripts, study plans, budgets, reports, permits, detailed sampling plans, and schedules. Assists supervisor in personnel activities. Presents project findings at professional fisheries meetings and to public interest groups. Adjunct Assistant Professor at Eastern Oregon University.

Past employment

Fisheries Research Biologist, (Assistant Project Leader), Oregon Department of Fish and Wildlife, October 1982 - July 1998.
Graduate Research Assistant, Oregon State University, September 1979 - September 1982.
Biological Technician, US Forest Service, June 1979 - September 1979.
Biological Intern, Weyerhaeuser Company, June 1978 - September 1978.

Expertise

Life history studies of fishes, population estimation of salmonids in streams, sampling of stream fish populations, PIT-tagging of salmonids, estimation of stream habitat quantity and quality, fish culture, hatchery effectiveness.

Recent publications

1997. Investigations into the early life history of naturally produced spring chinook salmon in the Grande Ronde River basin. (Jonasson, B. C., J. V. Tranquilli, M. Keefe, and R. W. Carmichael) Annual Progress Report. Bonneville Power Administration, Portland, OR.

1996. Investigations into the early life history of naturally produced spring chinook salmon in the Grande Ronde River basin. (Jonasson, B. C., R. W. Carmichael, and M. Keefe) Annual Progress Report. Bonneville Power Administration, Portland, OR.

1996. Residual hatchery steelhead: characteristics and potential interactions with spring chinook salmon in northeast Oregon. (Jonasson, B. C., R. W. Carmichael, and T. A. Whitesel) Oregon Department of Fish and Wildlife, Fish Research Project, Annual Project Report, Portland.

1995. Early life history study of Grande Ronde River basin chinook salmon. (Keefe, M., D. J. Anderson, R. W. Carmichael, and B. C. Jonasson) Annual Progress Report. Bonneville Power Administration, Portland, OR.

1994. Investigations into the life history of spring chinook salmon in the Grande Ronde River basin. (Keefe, M., R. W. Carmichael, B. C. Jonasson, R. T. Messmer, and T. A. Whitesel) Annual Progress Report. Bonneville Power Administration, Portland, OR.

Section 10. Information/technology transfer

- Reports -- Monthly, Quarterly, Annual.
- Technical Presentations and Manuscripts.
- Public and Civic Group Presentations.
- FWP Reviews.
- ODFW Research Reviews.
- Appropriate Regional Workshops.

Congratulations!